AGENDA

AVIATION TECHNICAL COMMITTEE MEETINGS
of the
Coordinating Research Council, Inc.

Embassy Suites
Alexandria, VA

May 2-5, 2016

Charter Members

API
The Boeing Company
DLA Energy
Federal Aviation Administration
NASA

Pratt & Whitney
Shell Aviation & Shell Global
United States Air Force
United States Navy

Contributing Members

Air BP
Air Total
Chevron Global Aviation
ExxonMobil Research & Engineering
Flint Hills Resources
GE Aviation

Honeywell
IATA
Innospec Fuel Specialties
Phillips 66 Company
Rolls-Royce Plc
SASOL Technology
Tesoro

Sponsor Members

PECOFacet
Gammon Technical Products
Policy for Attendance at CRC Meetings and Participation in CRC Projects

By attending CRC technical committee meetings and participating in CRC activities each attendee/recipient of CRC information agrees to the following:

1. **CRC Project Information and Data**

   Attendance at CRC technical committee meetings and participation in CRC projects is by invitation only at the discretion of the meeting chairperson(s) or project leader.

   It is understood that the major purpose of the work performed under the auspices of CRC is to develop information that may be made available to industry and the public through final publications only after the responsible CRC technical committee has reviewed the information and given its final approval for public release.

   Meeting attendees and project participants agree that any announcement or publication of data, information, or works in progress discussed in CRC meetings shall not be disclosed to anyone other than (i) CRC personnel, (ii) CRC members, or (iii) attendees at the meeting unless and until said information is approved by CRC.

2. **Intellectual Property**

   CRC meeting attendees and project participants agree that any and all intellectual property (including but not limited to patents, trade secrets, know-how, trademarks and copyrights) developed in connection with or during the course of any CRC sponsored research, as between CRC members and CRC, is the property of CRC and not the property of any CRC member or participant. CRC retains the right to place any such intellectual property in the public domain or to retain all rights thereto as described in CRC’s bylaws.

   Upon request, a CRC meeting attendee or program participant shall agree to work in good faith with the CRC on the filing of any application(s) related to the intellectual property developed in connection with or during the course of any CRC sponsored research. The CRC meeting attendee or program participant will work in good faith to avoid any time bar associated with IP filing requirements.
## TECHNICAL MEETING SCHEDULE

### 2016 CRC AVIATION MEETINGS

**Embassy Suites, Old Town Alexandria, VA**

### Monday, May 02, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
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<tbody>
<tr>
<td>12:00 PM - 1:00 PM</td>
<td>Registration</td>
<td>Ballroom Foyer</td>
</tr>
<tr>
<td>1:00 PM - 2:05 PM</td>
<td>Aviation Gasoline and Piston Fuels Group</td>
<td>Virginia Ballroom</td>
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<tr>
<td></td>
<td>Roger Gaughan, Chair, and Dave Atwood, Vice-Chair</td>
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</tr>
<tr>
<td>2:05 PM - 2:35 PM</td>
<td>BREAK</td>
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<tr>
<td>2:35 PM - 3:35 PM</td>
<td>Aviation Gasoline and Piston Fuels Group-Continued</td>
<td>Virginia Ballroom</td>
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<tr>
<td>3:35 PM - 4:05 PM</td>
<td>BREAK</td>
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<tr>
<td>4:05 PM - 6:00 PM</td>
<td>Aviation Gasoline and Piston Fuels Group-Continued</td>
<td>Virginia Ballroom</td>
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<tr>
<td>6:00 PM - 7:00 PM</td>
<td>Welcome Reception</td>
<td>Virginia Hall</td>
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</tbody>
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### Tuesday, May 03, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Location</th>
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<tbody>
<tr>
<td>8:00 AM - 8:30 AM</td>
<td>CRC Introduction and Overview</td>
<td>Virginia Ballroom</td>
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<tr>
<td></td>
<td>Steve Zabarnick, Chair, and Rob Midgley, Vice-Chair</td>
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<tr>
<td>8:30 AM - 9:45 AM</td>
<td>Fuel Handling and Contamination Group</td>
<td>Virginia Ballroom</td>
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<td>Jack Buffin, Chair, and Mark Bourdeau, Vice-Chair</td>
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<tr>
<td>9:45 AM - 10:35 AM</td>
<td>Low Temperature Group</td>
<td>Virginia Ballroom</td>
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<td>Don Phelps, Chair, and David Abdallah, Vice-Chair</td>
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<tr>
<td>10:35 AM - 11:05 AM</td>
<td>BREAK</td>
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<tr>
<td>11:05 AM - 12:05 PM</td>
<td>Production and Delivery Group</td>
<td>Virginia Ballroom</td>
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<tr>
<td></td>
<td>Enrico Lodrigueza, Chair, and Cinda Lohmann, Acting VC</td>
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</tr>
<tr>
<td>12:05 PM - 1:05 PM</td>
<td>Operability Group</td>
<td>Virginia Ballroom</td>
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<tr>
<td></td>
<td>John Rhode, Chair, and Rob Midgley, Vice-Chair</td>
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</tr>
<tr>
<td>1:05 PM - 2:35 PM</td>
<td>Lunch on Own</td>
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<tr>
<td>2:35 PM - 4:35 PM</td>
<td>Emerging Fuels Group - Session 1</td>
<td>Virginia Ballroom</td>
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<tr>
<td></td>
<td>Joanna Bauldreay, Chair, and Tim Edwards, Vice-Chair</td>
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<tr>
<td>6:00 PM - 7:00 PM</td>
<td>Networking Dinner</td>
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### Wednesday, May 04, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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</thead>
</table>
| 8:00 AM - 10:00 AM | **Fuel System Stability Group**  
*Steve Zabarnick, Chair, and Dan Baniszewski, Vice-Chair* | Virginia Ballroom |
| 10:00 AM - 10:30 AM | **BREAK**                                                                                       |                   |
| 10:30 AM - 12:20 PM | **Properties and Emissions Group**  
*Edwin Corporan, Chair, and David Abdallah, Vice-Chair* | Virginia Ballroom |
| 12:20 PM - 1:50 PM | **Lunch on Own**                                                                                |                   |
| 12:20 PM - 1:50 PM | **CRC Aviation Steering Committee Meeting (Members only)**  
*Steve Zabarnick, Chair, and Rob Midgley, Vice-Chair* | Carter Room       |
| 1:50 PM - 3:20 PM  | **Emerging Fuels Group - Session 2**                                                            | Virginia Ballroom |
| 3:20 PM - 3:40 PM  | **BREAK**                                                                                        |                   |
| 3:40 PM - 5:40 PM  | **Emerging Fuels Group - Session 3**                                                             | Virginia Ballroom |
| 6:00 PM - 7:00 PM  | **Networking Reception**                                                                        | Virginia Ballroom |

### Thursday, May 05, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
</table>
| 8:00 AM - 9:40 AM | **Advanced Research and Test Methods Group**  
*Robert E. Morris, Chair, and Jim Kinder, Vice-Chair* | Virginia Ballroom |
| 9:40 AM - 10:40 AM | **Publications Group**  
*Tedd Biddle, Chair, and Melanie Thom, Vice-Chair* | Virginia Ballroom |
| 10:40 AM - 11:00 AM | **BREAK**                                                                                        |                   |
| 11:00 AM - 11:30 AM | **Fuel System Safety Group**  
*David Parmenter, Chair, and Mark Rumizen, Vice-Chair* | Virginia Ballroom |
| 11:30 AM - 11:45 AM | **CRC Aviation Technical Committee**  
*Bill Taylor, Chair* | Virginia Ballroom |
| 11:45 AM - 12:00 PM | **CRC Aviation Committee Meeting Wrap-up and**  
*Steve Zabarnick, Chair, and Rob Midgley, Vice-Chair* | Virginia Ballroom |
| 12:00 PM     | **End of meetings**                                                                             |                   |
## Meeting Agenda

**CRC Activity:** Aviation Gasoline and Piston Fuels Group  
*Roger Gaughan, Chair, and Dave Atwood, Vice-Chair*

**Date:** Monday, May 02, 2016  
**Time:** 1:00 AM - 6:00 PM  
**Place:** Embassy Suites, Old Town, Alexandria, VA  
Virginia Ballroom

### Agenda:

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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</table>
| 1:00 - 1:10 | Intro  
*Roger Gaughan, RGG Aviation Consulting Services LLC.* |
| 1:10 - 1:25 | CRC Policies  
*Brent Bailey, CRC* |
| 1:25 - 1:45 | Carburetor Icing  
*Brian Kozak, Purdue* |
| 1:45 - 2:05 | Avgas Testing & Alternative Fuels Update  
*Melanie Thom, Purdue* |
| 2:05 - 2:35 | BREAK |
| 2:35 - 2:55 | Afton UL Avgas UL Avgas Candidate  
*Zach McAfee, Afton Chemical Company* |
| 2:55 - 3:15 | Swift Fuels UL Avgas Candidate  
*Chris D'Acosta, Swift Fuels* |
| 3:15 - 3:35 | PAFI Update  
*Peter White, FAA* |
| 3:35 - 4:05 | BREAK |
| 4:05 - 4:25 | Shell UL Avgas Candidate  
*Anton Hunt, Shell* |
| 4:25 - 4:45 | Lycoming Knock Detection System Correlations  
*Zach Mihalov, Lycoming* |
| 4:45 - 5:05 | EI, Def. Stan Activities  
*Alisdair Clark, BP* |
| 5:05 - 5:25 | Smoke Point and Cetane  
*David Abdallah, XOM* |
| 5:25 - 5:45 | Jet for Diesel Update  
*Roger Gaughan, RGG Aviation Consulting Services* |
| 5:45 - 6:00 | Wrap up & Action Items  
*Roger Gaughan, RGG Aviation Consulting Services* |
| 6:00 | Adjournment |
| 6:00 - 7:00 | Welcome Reception |
Meeting Agenda

CRC Activity: CRC Introduction and Overview

Steven Zabaranick, Chair, and Rob Midgley, Vice-Chair

Date: Tuesday, May 03, 2016

Time: 8:00 - 8:30 AM

Place: Embassy Suites, Old Town, Alexandria, VA

Virginia Ballroom

Agenda:

Opening of the 2016 CRC Aviation Meeting, Steven Zabaranick

Welcome

Call to Order

Introduction

Opening Remarks

Meeting Items of Interest, Jan Tucker, Coordinating Research Council

Activities

CRC Group/Panel Memberships

Operations and Current Activities of CRC Aviation Committee

Brent Bailey, Coordinating Research Council

Open Forum - Member Issues
## Meeting Agenda

### CRC Activity:
**Fuel Handling and Contamination Group**  
*Jack Buffin, Chair, and Mark Bourdeau, Vice-Chair*

### Date:
Tuesday, May 03, 2016

### Time:
8:30 AM - 9:45 AM

### Place:
Embassy Suites, Old Town, Alexandria, VA  
Virginia Ballroom

### Agenda:

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
<th>Presenter/Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:55 - 9:10</td>
<td>Tri-Service POL Users Group Overview</td>
<td>Joel Schmitigal, US Army TARDEC</td>
</tr>
<tr>
<td>9:30-9:45</td>
<td>Highlights of Comprehensive Analysis of Free Water Measurements in Fuel</td>
<td>Dr. Ed Andrews, Telectro Mek, Inc.</td>
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<tr>
<td>9:45</td>
<td>Adjournment</td>
<td></td>
</tr>
</tbody>
</table>
Meeting Agenda

CRC Activity: Low Temperature Group

Date: Tuesday, May 03, 2016
Time: 9:45 AM - 10:35 AM
Place: Embassy Suites, Old Town, Alexandria, VA
Virginia Ballroom

Agenda:

9:45 - 10:05  Determining the Fuel Temperature at which 12 cst Viscosity is Reached
Stu Porter, Biofuels Consulting

10:05 - 10:20  Freeze point measurements with jet fuels containing renewable diesel
David Abdallah, Exxon Mobil

10:20 - 10:35  Evaluation of Fuel Tank Topcoat Resistance to Fuel System Icing Inhibitor (FSII)
Zach West, University of Dayton Research Institute

10:35  Adjournment
Meeting Agenda

CRC Activity: Production and Delivery Group

Enrico Lodrigueza, Chair, and Cinda Lohmann, Acting Vice-Chair

Date: Tuesday, May 03, 2016
Time: 11:05 AM - 12:05 PM
Place: Embassy Suites, Old Town, Alexandria, VA
        Virginia Ballroom

Agenda:

11:00 - 11:05  Introduction
               Ron Juan, Marathon Petroleum Company

11:05 - 11:25  Thermal Stability of Jet
               Rod Woodford, Explorer Pipeline

11:25 - 11:35  WFS JFTOT Failure Experience in 2015-16
               John Thurston, World Fuels Services Corp.

11:35 - 11:50  Recent JFTOT Failures and Corrections
               Jason Mengel, Buckeye Partners, L.P.

11:50 - 12:00  JFTOT Trouble-Shooting Guide
               Ron Juan, Marathon Petroleum Company

12:00       Discussion
            ALL Presenter's

Adjournment
Meeting Agenda

CRC Activity: Operability Group
John Rhode, Chair, and Rob Midgley, Vice-Chair

Date: Tuesday, May 03, 2016
Time: 12:05 PM - 1:05 PM
Place: Embassy Suites, Old Town, Alexandria, VA
Virginia Ballroom

Agenda:

12:05 - 12:25 Water Separation Index (WSI) by Small Scale Water Separation Tester
   Alan Fougere, D-2 Incorporated

12:25 - 12:40 100 ppm FAME in Jet Emergency Uptake Provision Status
   Steve Howell, M4 Consulting representing Pipeliner Biodiesel Steering Committee (PBSC)

12:40 - 12:55 Data from US Pipelines on FAME Content in Existing Operations
   Steve Howell or TBD, PBSC

1:05 Adjournment
Meeting Agenda

CRC Activity: Emerging Fuels Group Session 1
Joanna Bauldreay, Chair, and Tim Edwards, Vice Chair

Date: Tuesday, May 3, 2016
Time: 2:35 - 4:35 pm
Place: Embassy Suites
Alexandria, VA

Agenda:

Time                          Name/Title
2:35 - 2:40                   Joanna Bauldreay, Shell
                               Introduction

2:40 - 3:10                   Mark Rumizen, George Wilson
                               ASTM Task Force Overview/OEM Review Status

3:10 - 3:40                   Arij Ben Amara, IFP Energies nouvelles – Engine Systems and Vehicles
                               Challenges for Alternative Fuels for Aeronautics - CAER project

3:40 - 4:00                   Ed Coppola
                               Status update on CHJ certification fuel production and testing

4:00 - 4:15                   Joanna Bauldreay, Shell
                               NATO AVT-225 project "Future Technological and Operational Challenges Connected with Application of Synthetic Fuels"

4:15 - 4:35                   Pam Serino, DLA
                               US Military Update, Alternative Fuel Purchases
Meeting Agenda

CRC Activity: Fuel System Stability Group
Steve Zabarnick, Chair, and Dan Baniszewski, Vice-Chair

Date: Wednesday, May 04, 2016
Time: 8:00 AM - 10:00 AM
Place: Embassy Suites, Old Town, Alexandria, VA
Virginia Ballroom

Agenda:

8:00 - 8:30 The Problems of Metrology and Unratable Streaks and the General Issue of Unintended Consequence in Specification Changes
George Wilson, SwRI

8:30 - 9:00 Heater Tube Deposit Examination by Multiwavelength Ellipsometry
Michael Collier, PAC LP

9:00 - 9:30 Development of Hydrocarbon-Based Fuels for High-Speed Applications
Matt DeWitt, UDRI

9:30 - 10:00 The Role of Nitrogen and Sulfur Species in Jet Fuel Thermal Stability
Steve Zabarnick, UDRI

10:00 Adjournment
Meeting Agenda

CRC Activity: Properties and Emissions Group
Edwin Corporan, Chair, and David Abdallah, Vice-Chair

Date: Wednesday, May 04, 2016
Time: 10:30 AM - 12:20 PM
Place: Embassy Suites, Old Town, Alexandria, VA
      Virginia Ballroom

Agenda:

10:30 - 10:50  NASA Emissions Reduction Programs
               Clarence Chang, NASA GRC

10:50 - 11:10  Effects of Jet Fuel Properties on Particle Emissions from a Gas Turbine:
               Development of a Jet Fuel Particle Index (JFPI)
               Imad Khalek, Southwest Research Institute

11:10 - 11:30  Capturing Physical Properties of Jet Fuel in the U.S.
               Donavan Johnson, Metron Aviation

11:30 - 11:50  In-flight Measurements of Exhaust Emissions
               Wajid Ali Chishty, NRC Canada

11:50 - 12:10  Fuels Combustion Research Programs at AFRL
               Edwin Corporan, Air Force Research Laboratory

12:20  Adjournment
Emerging Fuels Group Session 2

Joanna Bauldreay, Chair, and Tim Edwards, Vice Chair

Date: Wednesday, May 4, 2016
Time: 1:50 - 3:20 p.m.
Place: Embassy Suites
Alexandria, VA

Agenda:

<table>
<thead>
<tr>
<th>Time</th>
<th>Panel: Synthetic Jet Fuels for Aviation Panel (CA-69-98) - Program reviews</th>
</tr>
</thead>
</table>
| 1:50 - 2:15 | **Cliff Moses, Consultant**  
Fuel Effects on GT Combustor Performance and Durability Issues |
| 2:15 - 2:40 | **Randy Williams, Brad Culbertson, Honeywell**  
Atomization and Combustor Rig Evaluations of Petroleum and Synthetic Fuels |
| 2:40 - 3:05 | **Rick Kamin, Navy**  
Navy Status Update |
| 3:05 - 3:20 | **Chris Lewis, Consultant**  
Greenfuels FAME to HEFA Process |
Meeting Agenda

**CRC Activity:** Emerging Fuels Group Session 3  
*Joanna Bauldreay, Chair, and Tim Edwards, Vice Chair*

**Date:** Wednesday, May 4, 2016  
**Time:** 3:40 - 5:40 PM  
**Place:** Embassy Suites  
Alexandria, VA

**Agenda:**

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<thead>
<tr>
<th>Time</th>
<th>Research Projects</th>
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<tbody>
<tr>
<td>3:40 - 4:00</td>
<td>Hanson Solubility Parameter Review</td>
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<tr>
<td>4:00 - 4:25</td>
<td>Evaluating the Influence of Fuel Composition on the Performance of Static O-ring Seals</td>
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<tr>
<td>4:25 - 4:50</td>
<td>A Review of Material Compatibility Results</td>
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<tr>
<td>4:50 - 5:10</td>
<td>Update on National Jet Fuel Combustion Program</td>
</tr>
<tr>
<td>5:10 - 5:30</td>
<td>Correlating nvPM Emissions with Fuel Composition</td>
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<tr>
<td>5:30 - 5:40</td>
<td>Aviation Center of Excellence (ASCENT) update</td>
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**Chris Lewis, Consultant**  
3:40 - 4:00  
Hanson Solubility Parameter Review

**John Graham (UDRI), Al Fletcher, AFRL**  
4:00 - 4:25  
Evaluating the Influence of Fuel Composition on the Performance of Static O-ring Seals

**Cliff Moses, Consultant**  
4:25 - 4:50  
A Review of Material Compatibility Results

**Tim Edwards, AFRL**  
4:50 - 5:10  
Update on National Jet Fuel Combustion Program

**Cynthia Ginestra, Shell/Brice Dally, Virent**  
5:10 - 5:30  
Correlating nvPM Emissions with Fuel Composition

**Mohan Gupta, FAA**  
5:30 - 5:40  
Aviation Center of Excellence (ASCENT) update
CRC Activity: Advanced Research and Test Methods Group

Date: Thursday, May 5, 2016
Time: 8:00 AM - 9:40 AM
Place: Embassy Suites, Old Town, Alexandria, VA
        Virginia Ballroom

Agenda:

8:00 - 8:20  Impact of Alternative Aviation Fuels on Water Solubility & Demulsibility Characteristics
            Zachary West, University of Dayton Research Institute

8:20 - 8:40  CRC Proposal for Open-Source GCxGC Software Proof-of-Concept
            Cynthia Ginestra, Shell Global Solutions (US), Inc

8:40 - 9:00  On-site Fuel Screening Using a Portable Near-Infrared Spectrometer
            Wayne Smith, Real-Time Analyzers

9:00 - 9:20  Detection and Characterization of Polar and Nonpolar High Molecular Weight Fuel Contaminants
            Jeffrey A. Cramer, U.S. Naval Research Laboratory

9:20 - 9:40  Methods to Detect and Quantify Metal Deactivator Additives in Fuel
            Thomas N. Loegel, U.S. Naval Research Laboratory

9:40  Adjournment
Meeting Agenda

CRC Activity: Publications Group

Date: Thursday, May 05, 2016
Time: 9:40 AM - 10:40 AM
Place: Embassy Suites, Old Town, Alexandria, VA

Virginia Ballroom

Agenda:

9:40 - 9:50 Old Business
(10 min) T. Biddle, P&W, M. Thom Baere Aerospace
Introductions, review agenda, approve minutes

9:50 - 10:00 Handbook Updates
(10 min) Cliff Moses, Consultant
TS-1 Viscosity chart update

10:00 - 10:10 Heat of Vaporization and Enthalpy Report
(10 min) Stan Seto, Belcan
Report on Univ of Delaware research

10:10 - 10:20 Linking CRC Publications for Easier Access using CrossRef
(10 min) Brent Bailey, CRC, Inc.
Digital access to documents and information

10:20 - 10:30 Sheffield Data Capture
(10 min) Simon Blakely, Univ. Sheffield
Capturing fuel spec data and interrogate relationships

10:30 - 10:40 Closing and Adjournment
Meeting Agenda

CRC Activity: Fuel System Safety

David Parmenter, Chair, and Mark Rumizen, Vice-Chair

Date: Thursday, May 05, 2016
Time: 11:00 AM - 11:30 AM
Place: Embassy Suites, Old Town, Alexandria, VA

Virginia Ballroom

Agenda:

11:00 - 11:30 Determination of Maximum Charge Density (Streaming Current)

Rob Midgely, Shell Aviation

Adjournment
Meeting Agenda

CRC Activity: Aviation Technical Committee  
*Bill Taylor, Chair*

**Date:** Thursday, May 05, 2016  
**Time:** 11:30 PM - 11:45 PM  
**Place:** Embassy Suites, Old Town, Alexandria, VA  
Virginia Ballroom

**Agenda:**  
Call to Order  
Adoption of May 2015 Minutes  
Membership - Sign up sheets available  
Group Reports - Action Item Summary  
New Business  
Action Items  
Next Meeting / Adjournment

Meeting Agenda

CRC Activity: Aviation Committee Meeting Wrapup & Discussion  
*Steven Zabaranick, Chair, and Rob Midgley, Vice-Chair*

**Date:** Thursday, May 05, 2016  
**Time:** 11:45 PM - 12:00 PM  
**Place:** Embassy Suites, Old Town, Alexandria, VA  
Virginia Ballroom